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(54) Title: INSECT REPELLENT BASED ON A MIXTURE OF ESSENTIAL OILS

(57) Abstract: A natural and non-toxic composition is described which has surprisingly superior and super additive effectiveness over conventional insect repellents. In one embodiment, the composition is comprised of a mixture of essential oils, including lime oil, myrtle, citronella oil, eucalyptus oil and neem oil in a carrier oil. Alternatively, the neem oil may be used as a carrier oil. The composition may be provided in the form of a spray or topical cream.

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## INSECT REPELLENT BASED ON A MIXTURE OF ESSENTIAL OILS

1

2

3 The present invention relates to an insect repellent.  
4 More particularly the present invention relates to a  
5 composition, which can be applied to the skin in order to  
6 repel insects including, but not limited to mosquitoes  
7 and midges.

8

9 In a number of European countries including the UK, and  
10 particularly Scotland, the midge and horsefly are serious  
11 irritants, to tourists, gardeners and sports enthusiasts,  
12 such as ramblers, hill-walkers, climbers, etc. It is  
13 estimated that around 14,000 species of midge exist, some  
14 of which carry viruses which are known to be dangerous to  
15 animals. Whilst in general, midge bites are not  
16 particularly dangerous and rarely result in disease in  
17 humans, the bites can be unpleasant and cause pruritis  
18 (itching), urticaria (skin eruptions) and localised  
19 inflammation. Unfortunately, it is thought that the  
20 prevalence of these pests may increase as worldwide  
21 climate changes occur.

22

1 The common midge and fly are irritating but generally  
2 harmless pests. However in many countries serious and  
3 potentially fatal diseases are spread by insects, such as  
4 mosquitoes. For example, the mosquito-borne illness,  
5 malaria, is one of the main killer diseases of the world,  
6 and causes an estimated 1 to 2 million deaths per year.  
7 In addition mosquito-borne illnesses are estimated to be  
8 transmitted to more than 700 million people annually.  
9 In some parts of Africa it is estimated that 10% of the  
10 total mortality of infants under the age of 5 is due  
11 directly to the disease. Although historically this  
12 serious illness was localised in tropical areas such as  
13 Central and South America, the Middle East, the Indian  
14 sub-continent and Asia, the prevalence of malaria is  
15 rising due to temporary migration of the population  
16 between these countries, primarily due to the increase in  
17 popularity of tropical destinations for holidays and  
18 vacations. This is exemplified in the UK, where the  
19 number of reported cases of malaria has increased  
20 dramatically in recent decades due to foreign travel.  
21 Although malaria can be cured with prescription drugs,  
22 many mosquito species have developed resistance to common  
23 anti-malarial drugs. Therefore, as with many insect  
24 borne illnesses, prophylaxis is seen as preferable to  
25 cure. This is generally achieved through a combination  
26 of vaccination and also by the prevention of bites in the  
27 first instance.

28  
29 Other diseases spread by insects, include the viral  
30 illnesses Yellow Fever, Dengue Fever, Encephalitis and  
31 Filariasis which are all mosquito-borne. For the  
32 majority of these illnesses there are no preventative  
33 vaccines, and often no specific treatment. Thus the

1 essence of prevention is to avoid being bitten in the  
2 first place and protection from arthropod bites is  
3 paramount in ensuring a reduction in insect-borne  
4 disease. For example at present there is no effective  
5 drug treatment for Yellow Fever or Encephalitis, and  
6 therefore prophylaxis is essential. Yet further, there  
7 is no current effective vaccination for Dengue Fever, and  
8 therefore it is vitally important that the initial insect  
9 bite is avoided.

10

11 Other insect-borne diseases include leishmaniasis which  
12 is transmitted by sandflies; sleeping sickness  
13 transmitted by the tsetse fly; lyme disease and typhus  
14 fever which are transmitted by ticks.

15

16 The demand for suitable insect repellents is therefore at  
17 an all-time high. There are many well known insect  
18 repellents on the market. Historically, most include the  
19 chemical DEET (N,N diethyl-3-methylbenzamide) or DEET  
20 derivatives. The efficacy of DEET in repelling biting  
21 insects has so far not been matched by any other natural  
22 or synthetic product since being introduced in 1975. It  
23 is estimated that 38% of the American population, and  
24 over 200 million people worldwide, use DEET preparations  
25 every year. However, whilst this chemical has been  
26 proven to be highly effective in repelling insects, it is  
27 highly toxic and can be absorbed through the skin. The  
28 toxicity, due to the pharmacokinetics of the chemical,  
29 has resulted in a catalogue of reported minor to serious  
30 adverse effects in use. Heavy exposure to the chemical  
31 is known to induce memory loss, weakness, headache,  
32 fatigue, muscle and joint pain tremors and shortness of  
33 breath. Yet further, DEET can act as a skin irritant and

1 has a disagreeable odour. In addition, care must be  
2 taken to avoid furnishings, plastic, varnished and  
3 painted surfaces, when using repellents containing this  
4 chemical. Accordingly, in recent years there has been a  
5 move towards the search for natural, non-toxic yeast  
6 effective insect repellents, which do not cause  
7 irritation or toxicity to the user.

8

9 It is an object of the present invention to provide a  
10 natural insect repellent, which is non-toxic to the user.

11

12 Yet further, it is an object of the present invention to  
13 provide a natural insect repellent, which is non-irritant  
14 and has a pleasant smell.

15

16 It is a further aim of the present invention to provide  
17 an insect repellent, which is effective against insects  
18 such as fleas, ticks, gnats and, in particular, midges  
19 and mosquitoes.

20

21 According to a first aspect of the present invention,  
22 there is provided a composition, which is effective in  
23 repelling insects, comprising a mixture of essential oils  
24 in a carrier oil.

25

26 Preferably the essential oils are lime oil, myrtle,  
27 citronella oil, eucalyptus oil and neem oil.

28

29 In a preferred embodiment, the carrier oil is grape seed  
30 oil. However, other carrier oils may be used, including  
31 almond oil, avocado oil, vegetable oil, wheat flour oil  
32 or sunflower oil, soya oil or a mixture thereof.

33

1 Preferably the carrier oil constitutes in the region of  
2 50% of the composition.

3

4 Preferably the essential oils constitutes in the region  
5 of 50% of the composition.

6

7 Preferably the neem oil is present in a concentration of  
8 between 740 and 760 drops per 37ml of the composition.

9

10 Most preferably the neem oil is present in a  
11 concentration of 750 drops per 37 ml of the composition.

12

13 Most preferably the myrtle is bog myrtle.

14

15 The neem oil may be in the form of an extract of the  
16 Indian Neem tree *Azadirachta Indica*.

17

18 Preferably the lime oil is present in a concentration of  
19 between 8 and 12 drops per  $\frac{1}{2}$ ml of the composition.

20

21 Most preferably the lime oil is present in a  
22 concentration of 10 drops per  $\frac{1}{2}$  ml of the composition.

23

24 Preferably the myrtle oil is present in a concentration  
25 of between 28 and 32 drops per  $1\frac{1}{2}$ ml of the composition.

26

27 Most preferably the myrtle oil is present in a  
28 concentration of 30 drops per  $1\frac{1}{2}$  ml of the composition.

29

30 Preferably the citronella oil is present in a  
31 concentration of between 190 and 210 drops per 10ml of  
32 the composition.

33

1 Most preferably the citronella oil is present in a  
2 concentration of 200 drops per 10 ml of the composition.

3

4 Preferably the eucalyptus oil is present in a  
5 concentration of 3 to 7 drops per  $\frac{1}{4}$  ml of the composition.

6

7 Most preferably the eucalyptus oil is present in a  
8 concentration of 5 drops per  $\frac{1}{4}$  ml of the composition.

9

10 Optionally the composition is provided as a spray.

11

12 The composition is intended for topical use.

13

14 The composition is suitable for use on humans and  
15 animals.

16

17 The composition repels insects including, but not limited  
18 to midges, mosquitoes, gnats, ticks, flies and fleas.

19

20 Preferably the composition has a pleasant odour.

21

22 According to a second aspect of the present invention,  
23 there is provided a composition, which is effective in  
24 repelling insects, comprising a mixture of lime oil,  
25 myrtle, citronella oil, eucalyptus oil and neem oil.

26

27 Most preferably the myrtle is bog myrtle.

28

29 Preferably the essential oils constitutes in the region  
30 of 50% of the composition.

31

32 Preferably the lime oil is present in a concentration of  
33 between 8 and 12 drops per  $\frac{1}{4}$  ml of the composition.

1

2 Most preferably the lime oil is present in a  
3 concentration of 10 drops per  $\frac{1}{2}$  ml of the composition.

4

5 Preferably the myrtle oil is present in a concentration  
6 of between 28 and 32 drops per  $1\frac{1}{2}$  ml of the composition.

7

8 Most preferably the myrtle oil is present in a  
9 concentration of 30 drops per  $1\frac{1}{2}$  ml of the composition.

10

11 Preferably the citronella oil is present in a  
12 concentration of between 190 and 210 drops per 10ml of  
13 the composition.

14

15 Most preferably the citronella oil is present in a  
16 concentration of 200 drops per 10 ml of the composition.

17

18 Preferably the eucalyptus oil is present in a  
19 concentration of 3 to 7 drops per  $\frac{1}{4}$  ml of the composition.

20

21 Most preferably the eucalyptus oil is present in a  
22 concentration of 5 drops per  $\frac{1}{4}$  ml of the composition.

23

24 The neem oil comprises the remainder of the composition  
25 and acts as a carrier oil.

26

27 Optionally the composition is provided as a spray.

28

29 The composition is intended for topical use.

30

31 The composition repels insects including, but not limited  
32 to midges, mosquitoes, gnats, ticks, flies and fleas.

33

1 Preferably the composition has a pleasant odour.

2

3 According to the third aspect of the present invention,  
4 there is provided a composition, which is effective in  
5 repelling insects, comprising a mixture of essential oils  
6 and a base cream.

7

8 Preferably the essential oils are lime oil, myrtle,  
9 citronella oil, eucalyptus oil and neem oil.

10

11 Most preferably the myrtle is bog myrtle.

12

13 Optionally the composition comprises a carrier oil which  
14 may be grape seed oil, however other carrier oils may be  
15 used, including almond oil, avocado oil, vegetable oil,  
16 wheat flour oil or sunflower oil, soya oil or a mixture  
17 thereof.

18

19 Typically the base cream comprises a mixture of aqua,  
20 prunus dulcis, glycerine (vegetable), cetearyl alcohol,  
21 stearic acid, triethanolamine, ceteareth 20, methyl  
22 paraffin, imidazolidinyl urea and propyl paraffin.

23

24 The composition is intended for topical use.

25

26 Preferably the composition has a pleasant odour.

27

28 Advantageously, the described composition has an  
29 agreeable smell, and is completely natural and non-toxic  
30 to the user.

31

32 In the present invention, it has been discovered that the  
33 described composition has surprisingly superior and

1 super-additive effectiveness over conventional insect  
2 repellents in repelling midges and mosquitoes.  
3 Specifically, it has been discovered that by preparing a  
4 composition comprising 10 drops per  $\frac{1}{2}$  ml of lime oil, 30  
5 drops per  $1\frac{1}{2}$  ml of bog myrtle, 200 drops per 10 ml of  
6 citronella oil, 5 drops per  $\frac{1}{4}$  ml of eucalyptus oil and  
7 740 drops per 37 ml of neem oil, preferably with a  
8 carrier oil results in a superior non-toxic insect  
9 repellent.

10  
11 It is well known in the field of aromatherapy to refer to  
12 quantities of essential oils in the form of "drops per  
13 ml". Generally 20 drops is equivalent to 1ml of  
14 essential oil, although the important concept is the  
15 quantity of the essential oil relative to the carrier  
16 oil, or other oils, as opposed to the exact quantity  
17 used.

18  
19 In the preferred embodiment, grape seed oil is used as a  
20 carrier, however it will be appreciated that any suitable  
21 natural oil, such as almond oil, avocado oil, vegetable  
22 oil, wheat flour oil or sunflower oil, soya oil or indeed  
23 a mixture thereof could be used.

24  
25 It is also appreciated that any form of eucalyptus, such  
26 as lavender eucalyptus or lemon eucalyptus could be used  
27 within the composition. Similarly, whilst the use of bog  
28 myrtle is preferred, any alternative and corresponding  
29 type of myrtle, such as white myrtle, could be used.

30  
31 In an alternative embodiment, the carrier oil could be  
32 removed altogether, and the neem oil could be substituted  
33 as the carrier base.

1  
2 The composition can be provided in the form of a spray or  
3 a topical cream or ointment.

4  
5 The effectiveness of the composition described in the  
6 present Application has been tested in the laboratory.  
7 Comparative tests were carried out with 14 volunteers  
8 using an arm in cage technique with adult laboratory  
9 reared Aedes Aegypti (Cucilidae) insects. In this  
10 technique an area of skin (in this case the hand/arm) is  
11 coated with the composition being tested and then exposed  
12 to the insects (typically around 20 insects) within an  
13 enclosure for a set, standard period of time. The  
14 enclosures were thick plastic cylinders with a resealable  
15 opening at one end, into which a volunteers hand could be  
16 placed. All areas of the enclosure where viewable from  
17 the outside. The insects used, were chosen primarily due  
18 to their prevalence in tropical and subtropical regions.  
19 The species is a notorious insect vector. In addition  
20 this species is relatively large in size which  
21 facilitated observation regarding their movement and  
22 behavioural response to the various repellents during the  
23 tests. Effectiveness was calculated by two means,  
24 firstly by visual observation of the number of mosquitoes  
25 which land on the tester's hands, and secondly by  
26 counting of the number of visible bites which appear at  
27 the end of the test.

28  
29 The volunteers were selected to representative of varying  
30 age groups and consisted of 6 males and 8 females.  
31 Repellency was calculated by measuring the landing rates  
32 of the insects. Specifically the percentage decline of  
33 mosquitoes landing within a predetermined area of skin

1 was used as a measure of repellency efficacy. Each  
2 volunteer first undertook a control test by placing their  
3 untreated arm into the enclosure containing a mixed  
4 population of the mosquitoes. Both left and right hands  
5 were used. The volunteers wore protective gloves with a  
6 4 X 6 cm square cut away, to serve as an assessment area.  
7 The assessment area could be easily viewed through the  
8 enclosure. The landing rate of the mosquitoes, and  
9 behaviour, was observed for a period of 5 minutes.  
10 Following the control test, one of the compositions being  
11 tested was applied to the exposed area of skin and  
12 allowed to dry for 10 minutes, as all products tested  
13 were aqueous solutions, and thus a period was required to  
14 allow the composition to dry on the skin. The procedure  
15 was then repeated for the treated hand.

16

17 Five commercially available repellents were compared to  
18 the composition of the present invention. Two of the  
19 five were synthetic DEET based products. The third  
20 repellent contained the active ingredient of citronella,  
21 in order to allow comparison of the repellency of the  
22 composition of the present Application with citronella.  
23 The fourth repellent was neem based, with concentrated  
24 solutions of eucalyptus, bergamot and rosemary, and  
25 allowed comparison of the repellency of the composition  
26 of the present Application with neem oil. A fifth  
27 product, a cosmetic moisturiser containing citronella was  
28 also tested.

29

30 Figure 1 illustrates the comparative efficacy of the  
31 compositions tested. Percentage repellency was  
32 calculated using:

33

$$\frac{100 - \text{no of bites on treated hand} \times 100}{\text{no of bites on control hand}}$$

3

4 As expected the two DEET based treatments showed the  
5 greatest repellency. However whilst these products have  
6 excellent repellency (inducing on average 84.7% and 84.6%  
7 reduction in mosquito landings) the disadvantages of  
8 these products (toxicity, high skin absorption,  
9 unpleasant smell are well documented.

10

11 The fifth repellent (neem based, with concentrated  
12 extracts of eucalyptus, bergamot and rosemary) provided  
13 the least protection from mosquito landing and in some  
14 cases failed to reduce landing rates at all. The fourth  
15 repellent, a cosmetic moisturiser reputed to have  
16 repellent properties and containing citronella, provided  
17 more protection (an average of 57.6% reduction) but was  
18 short-lived, and it is thought that the mosquitoes were  
19 temporarily repelled by the perfume component of this  
20 product. The third citronella based repellent was more  
21 effective, providing a 62% reduction in mosquito  
22 landings. However in the tests the composition of the  
23 present Application induced the closest effects to the  
24 DEET products - reducing mosquito landings by 70.6% - an  
25 additional 30% over the Neem oil based product (repellent  
26 No 5). Accordingly the composition of the present  
27 Application, which consists of a combination of essential  
28 oils, has a surprisingly synergistic effect over existing  
29 commercially available products containing these  
30 essential oils.

31

32 In addition to counting the number of landings/bites,  
33 observations of the behavioural changes in the test

1 mosquitoes were made. This was done in order to  
2 determine where any of the compositions being tested  
3 modified or inhibited the normal mosquito behaviour.

4

5 When exposed to the DEET based repellents a dramatic  
6 change was observed in the mosquito behaviour - namely  
7 that activity levels fell greatly. Flight activity was  
8 reduced and many of the mosquitoes were observed to rest  
9 on the surface of the enclosure. In addition the  
10 mosquitoes displayed excessive cleaning, in some cases  
11 frantic cleaning of the antenna, and extensive cleaning  
12 of the proboscis, wings and appendages. This behavioural  
13 response was noticed most in male mosquitoes. These  
14 behavioural responses were not observed when the  
15 remaining three commercially available, and natural based  
16 compositions were tested, i.e. the citronella based  
17 repellent, cosmetic citronella based moisturiser, and the  
18 neem oil with extracts of eucalyptus, rosemary and  
19 bergamot) based repellent.

20

21 However, when tested, and surprisingly, the composition  
22 of the present invention elicited the same behavioural  
23 responses as the DEET products - i.e. inactivity and  
24 excessive cleaning. In addition the mosquitoes displayed  
25 irregular body movements and incoordination - many of the  
26 mosquitoes showed inability to retain grip on the  
27 enclosure walls. This was surprising as behavioural  
28 changes were not observed with the three natural based  
29 commercially available repellents. Prior to testing it  
30 was expected that behaviour of the insects when exposed  
31 to the composition of the present invention would be  
32 closer to the behaviour elicited by these other natural  
33 repellents, and not, as actually occurred in the testing,

1 the synthetic DEET products. It has been postulated that  
2 the observed inability to co-ordinate movement is a  
3 result of highly oxidised azadirachtin molecules (the  
4 active ingredient of the neem oil in the present  
5 composition) targeting the nervous system of the insects  
6 and disrupting ganglier processes. Nevertheless these  
7 behavioural changes were not observed with the  
8 commercially available neem based product. These results  
9 suggest the composition of the present invention is  
10 substantially more effective at curtailing insect or  
11 mosquito attack than existing natural products, as it  
12 induces a lack of activity and incoordination in the  
13 mosquitoes, thus preventing biting, in a similar manner  
14 to synthetic DEET based repellents.

15  
16 After exposure to the composition of the present  
17 invention, the alteration in the mosquitoes behaviour was  
18 observed to last for many hours. However after 24 hours  
19 all symptoms had disappeared, leaving no apparent lasting  
20 damage to the insects.

21  
22 The composition herein described has been shown to have a  
23 substantially greater efficacy at repelling insects than  
24 existing commercially available natural oil based  
25 repellents. In particular the composition which consists  
26 of a mixture of lime oil, myrtle, citronella oil,  
27 eucalyptus oil and neem oil, has been shown to have a  
28 surprisingly greater efficacy at repelling insects than  
29 commercially available citronella or neem based  
30 repellents. The composition of the present invention,  
31 has an efficacy close to synthetic DEET products and  
32 elicits a behavioural response in mosquitoes very similar  
33 to DEET, but which is not produced by existing natural

1 oil based repellents. Although the present composition  
2 has been shown to have a similar efficacy to DEET, it has  
3 inherent advantages over this synthetic repellent, as it  
4 has no toxic side-effects, and has a pleasant smell.

5

6 Modifications and improvements may be made to the  
7 foregoing without departing from the scope of the  
8 invention.

1    CLAIMS

2

3    1. A composition, which is effective in repelling  
4       insects, comprising a mixture of essential oils in a  
5       carrier oil.

6

7    2. A composition as claimed in Claim 1, wherein the  
8       essential oils are lime oil, myrtle, citronella oil,  
9       eucalyptus oil and neem oil.

10

11    3. A composition as claimed in any one of the preceding  
12       Claims, wherein the carrier oil is grape seed oil.

13

14    4. A composition as claimed in any one of the preceding  
15       Claims, wherein the carrier oil is almond oil.

16

17    5. A composition as claimed in any one of the preceding  
18       Claims, wherein the carrier oil is avocado oil.

19

20    6. A composition as claimed in any one of the preceding  
21       Claims, wherein the carrier oil is vegetable oil.

22

23    7. A composition as claimed in any one of the preceding  
24       Claims, wherein the carrier oil is wheat flour oil.

25

26    8. A composition as claimed in any one of the preceding  
27       Claims, wherein the carrier oil is sunflower oil.

28

29    9. A composition as claimed in any one of the preceding  
30       Claims, wherein the carrier oil constitutes 50% of  
31       the composition.

32

1 10. A composition as claimed in Claim 9, wherein the  
2 essential oils constitute the remaining 50% of the  
3 composition.

4

5 11. A composition as claimed in any one of the preceding  
6 Claims, wherein the neem oil is present in a  
7 concentration of between 740 and 760 drops per 37ml  
8 of the composition.

9

10 12. A composition as claimed in Claim 11, wherein the  
11 neem oil is present in a concentration of 750 drops  
12 per 37 ml of the composition.

13

14 13. A composition which is effective in repelling  
15 insects, comprising a mixture of lime oil, myrtle,  
16 citronella oil, eucalyptus oil and neem oil.

17

18 14. A composition as claimed in Claim 13, wherein the  
19 neem oil acts as a carrier oil.

20

21 15. A composition as claimed in any one of the preceding  
22 Claims, wherein the myrtle is bog myrtle.

23

24 16. A composition as claimed in any one of the preceding  
25 Claims, wherein the neem oil is an extract of the  
26 Indian Neem tree *Azadirachta Indica*.

27

28 17. A composition as claimed in any one of the preceding  
29 Claims, wherein the lime oil is present in a  
30 concentration of between 8 and 12 drops per  $\frac{1}{2}$  ml of  
31 the composition.

32

1 18. A composition as claimed in Claim 17, wherein the  
2 lime oil is present in a concentration of 10 drops  
3 per  $\frac{1}{2}$  ml of the composition.

4

5 19. A composition as claimed in any one of the preceding  
6 Claims, wherein the myrtle oil is present in a  
7 concentration of between 28 and 32 drops per  $1\frac{1}{2}$  ml  
8 of the composition.

9

10 20. A composition as claimed in Claim 19, wherein the  
11 myrtle oil is present in a concentration of 30 drops  
12 per  $1\frac{1}{2}$  ml of the composition.

13

14 21. A composition as claimed in any one of the preceding  
15 Claims, wherein the citronella oil is present in a  
16 concentration of between 190 and 210 drops per 10 ml  
17 of the composition.

18

19 22. A composition as claimed in Claim 21, wherein the  
20 citronella oil is present in a concentration of 200  
21 drops per 10 ml of the composition.

22

23 23. A composition as claimed in any one of the preceding  
24 Claims, wherein the eucalyptus oil is present in a  
25 concentration of 3 to 7 drops per  $\frac{1}{2}$  ml of the  
26 composition.

27

28 24. A composition as claimed in Claim 23, wherein the  
29 eucalyptus oil is present in a concentration of 5  
30 drops per  $\frac{1}{2}$  ml of the composition.

31

32 25. A composition as claimed in any one of the preceding  
33 Claims in the form of a spray.

- 1
- 2 26. A composition which is effective in repelling
- 3 insects comprising a mixture of essential oils and a
- 4 base cream.
- 5
- 6 27. A composition as claimed in Claim 26, wherein the
- 7 essential oils are lime oil, myrtle, citronella oil,
- 8 eucalyptus oil and neem oil.
- 9
- 10 28. A composition as claimed in Claim 27, wherein the
- 11 myrtle is bog myrtle.
- 12
- 13 29. A composition as claimed in any one of Claims 26 to
- 14 comprising a carrier oil.
- 15
- 16 30. A composition as claimed in Claim 29, wherein the
- 17 carrier oil is grape seed oil.
- 18
- 19 31. A composition as claimed in Claim 29, wherein the
- 20 carrier oil is almond oil.
- 21
- 22 32. A composition as claimed in Claim 29, wherein the
- 23 carrier oil is avocado oil.
- 24
- 25 33. A composition as claimed in Claim 29, wherein the
- 26 carrier oil is vegetable oil.
- 27
- 28 34. A composition as claimed in Claim 29, wherein the
- 29 carrier oil is wheat flour oil.
- 30
- 31 35. A composition as claimed in Claim 29, wherein the
- 32 carrier oil is sunflower oil.
- 33

1 36. A composition as claimed in Claim 29, wherein the  
2 carrier oil is soya oil.

3

4 37. A composition as claimed in any one of Claims 26 to  
5 wherein the base cream comprises a mixture of  
6 aqua, prunus dulcis, glycerine (vegetable), cetearyl  
7 alcohol, stearic acid, triethanolamine, ceteareth  
8 20, methyl paraffin, imidazolidinyl urea and propyl  
9 paraffin.

10

11 38. A composition as claimed in any one of the preceding  
12 Claims intended for topical use.

13

14 39. A composition as claimed in any one of the preceding  
15 Claims, having a pleasant odour.

16

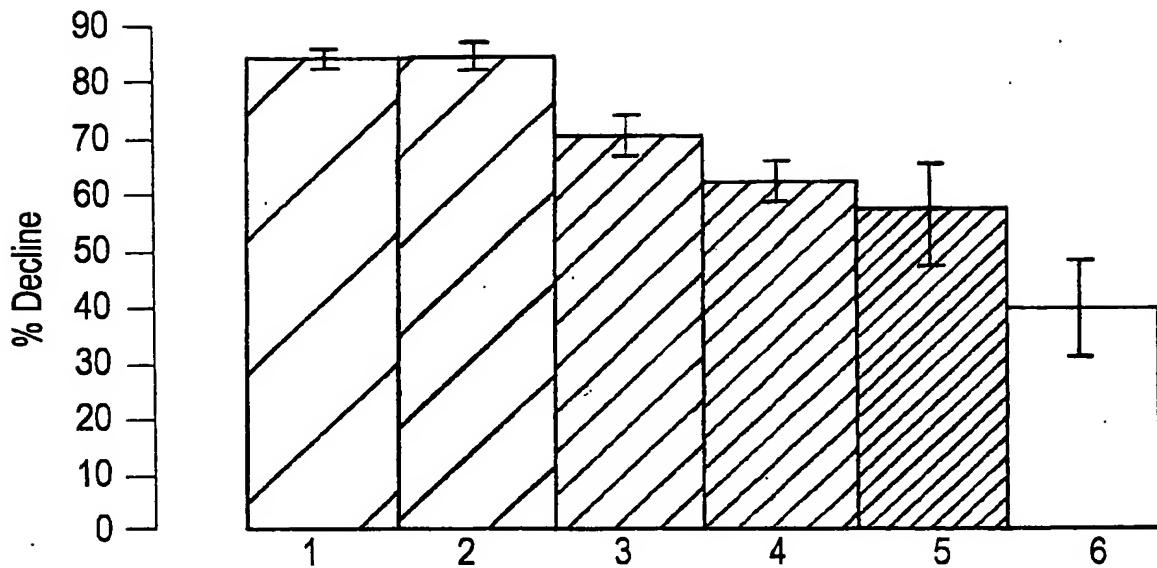
17 40. A composition as claimed in any one of the preceding  
18 Claims, being suitable for repelling insects such as  
19 midges, mosquitoes, gnats, ticks, flies and fleas.

20

21 41. A composition as claimed in any one of the preceding  
22 Claims suitable for use on humans.

23

24 42. A composition as claimed in any one of the preceding  
25 Claims suitable for use on animals.



1. Deet based repellent (Jungle Formula<sup>TM</sup>)
2. Propidine based repellent (Autan<sup>TM</sup>)
3. Composition of present invention
4. Citronella based repellent (MosiGuard<sup>TM</sup>)
5. Citronella based moisturiser (Avon Skin-so-soft<sup>TM</sup>)
6. Neem based repellent with extracts of eucalyptus, bergamot and rosemary (India Tree<sup>TM</sup>)

Fig. 1

101532998

## INTERNATIONAL SEARCH REPORT

Internal Application No  
PCT/GB 03/04580A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A01N65/00 // (A01N65/00, 65:00)

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, CHEM ABS Data, BIOSIS, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 106 622 A (SHERWOOD KAREN ET AL) 21 April 1992 (1992-04-21) column 3, line 36 - line 39 column 3, line 58 - line 67	2-25, 27-42
A	WO 91 15118 A (PRIMAVERA LAB INC) 17 October 1991 (1991-10-17) page 5, paragraph 2; table 2	2-25, 27-42
A	DATABASE WPI Section Ch, Week 199748 Derwent Publications Ltd., London, GB; Class C03, AN 1997-513653 XP002270148 & CN 1 125 092 A (WANG J), 26 June 1996 (1996-06-26) abstract	2-25, 27-42

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

12 February 2004

Date of mailing of the International search report

08/03/2004

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## INTERNATIONAL SEARCH REPORT

Int'l application No.  
PCT/GB 03/04580

### Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: 1,26 because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

#### Remark on Protest

The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1,26

Present claims 1 and 26 relate to an insect repellent composition, comprising a mixture of essential oils in a carrier oil or in a base cream.

The claims cover a huge number of compositions, whereas the application provides support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT for only a very limited number of such compositions, namely for compositions comprising all of the five essential oils mentioned in claims 2, 13, or 27. In the present case, claims 1 and 26 so lack support, and the application so lacks disclosure.

Independent of the above reasoning, the claims also lack clarity (Article 6 PCT): The tests carried out by the Applicant in order to measure the repellency efficacy of the claimed compositions with regard to other insect repellents, comprises the comparison with a neem based commercial composition containing concentrated solutions of eucalyptus, bergamot, and rosemary. This comparative neem based repellent showed the poorest efficacy and the Applicant clearly considers it as not belonging to the invention (cf. pg. 13, l. 21-29 and pg. 14, l. 25-30 of the description). It appears however, that the mentioned comparative repellent falls under the definition of Claim 1. This inconsistency renders the scope of the claims unclear, particularly of claims 1 and 26.

Furthermore, the applicant's attention is drawn to the fact, that insect repellent compositions comprising a mixture of essential oils in a carrier oil or in a base cream are well known in the art (e.g. commercial neem based repellent of the comparative test and the presently cited documents) and the initial phase of the search already revealed a very large number of documents relevant to the issue of novelty.

The combination of unclarity and lack of novelty renders a meaningful search over the whole breath of claims 1 and 26 impossible. Consequently, the search has been restricted to:

Compositions comprising a mixture of lime oil, myrtle, citronella oil, eucalyptus oil, and neem oil. Accordingly, present Claim 13 has been considered to be the independent claim and claims 2-12, 14-25, and 27-42 have been regarded as depending upon Claim 13.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an International preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

**INTERNATIONAL SEARCH REPORT**

Internal Application No  
PCT/GB 03/04580

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
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CN 1125092	A	26-06-1996		NONE		